

Public Sector Wage Inflation in Ontario

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INTRODUCTION

In the ten years immediately before the establishment of the Anti-Inflation Board (AIB) there were large increases in public sector wage settlements. In 1974, for example, the average negotiated wage settlement in what is defined below as the Ontario health subsector was 26.8 per cent a year; in 1975 settlements of 18 per cent a year were not uncommon. Furthermore, the 1968-75 period saw a very rapid growth of the public sector and of collective bargaining within it. No wonder that the labour unions of the public sector were frequently blamed for exacerbating inflation. The claim that public wage settlements were out of control and 'spilling over' into private sector contracts was widely accepted.

In the press of 1973-4, for example, we find the the following headlines: 'Civil service sets pace with stiff wage demands' (Financial Post, 19 October 1974); 'Civil service pay going out of kilter - faster' (Financial Post, 3 February 1973); 'Civil service win may start an avalanche' (Financial Post, 17 August 1974). Two years later a similar interpretation was offered by Courchene (1977): 'The role for government as an employer is to ensure that the public sector is the follower not the leader in the wage process ... Not an insignificant portion of the current wage explosion can be attributed to the fact that the public sector assumed the role of wage leader in the post-float period.' By 1978 opinion had not substantially changed: 'The salaries and fringe benefits paid to public and para-public workers are now generally accepted to be the main culprit for our present lack of competitiveness. Generous wage agreements in the public sector have forced industry to pay more than the market can bear.' (Financial Post, 4 February 1978).

Such strong statements were somewhat surprising since until then very little attention had been paid to public sector wages. One reason for the earlier neglect was that the public sector had only in the preceding ten years acquired a substantial unionized sector. A consequence was that economic analysis of public sector wage determination remained rudimentary. It was commonly supposed that traditional wage theory was deficient in explaining the public sector in any case, unions or not. For example, Fogel and Lewin (1974, 414) suggested that the application of traditional wage theory to the American public sector might be weakened by 'the absence of a motive for profit maximization in government and the lack of a

conventional demand curve for labor.' An explanation of public sector wages should thus place less emphasis on economic variables such as labour market conditions and price changes and stress political processes instead. Indeed, political factors are often thought to play the crucial role in public sector wage negotiations, overriding even traditional market forces. Thus inflationary wage behaviour in the public sector may well coexist with wage restraint in the private sector. Moreover, if wage spillovers occur between the public and private sectors, it can be argued that wage restraint in the private sector will break down (regardless of the state of the labour market).

But is the public sector completely different from the private sector? Public employers must also obtain additional workers from the labour market. Where many vacancies exist, competition for workers by all employers will push wages up in both sectors. Under competition, if public sector wages do not rise along with those in the private sector, governments will be unable to retain or enlarge their own labour forces. In a slack economy governments (like the private sector) face constraints as tax revenues decline with personal incomes. Although governments can compensate by raising tax rates, borrowing funds, or even printing money, there are political limitations to such actions. Although the ability-to-pay constraint in the public sector may not be as keen or as immediate as in the private sector, it nonetheless exists and eventually should come into play. Furthermore, policy-makers may believe that when unemployment is high, wage settlements ought to be lower (the traditional 'Phillips curve' tradeoff view of the world) and instruct their negotiators to bargain accordingly. A tough public bargaining posture may also be adopted during an economic downswing if there is a suspicion (even an unjustified one) that public sector settlements tend to set the pace for the private sector.

Even with a general surplus of labour, an expansion of a particular segment of the public sector may force wages up because government hiring does not normally draw from the pool of relatively untrained unemployed. The public sector needs workers with experience and skills, and since such people tend to have jobs they have to be bid away from them. The concentration of government in large cities intensifies that competition.

The general absence of substitution of capital for labour in the public

sector and the fact that many public employees bargain from a position of job tenure may give rise to unequal bargaining power in different areas of the public service. Concessions to one group of public sector employees make it hard for the government to resist equal wage demands by other public employees. In addition, the limitation imposed by revenues depends on the jurisdiction. Not only are tax elasticities different (public revenues rise at different rates in response to inflation) but the salary proportion of the total budget also varies considerably. At the federal level less than 20 per cent of the total budget is allocated to salaries, whereas at the local level salaries account for more than 60 per cent of current expenditures. For that reason a 10 per cent rise in wages, for example, will have different effects in these two cases. Thus, depending upon the importance of wages in their budgets, employers in different levels of government may react differently to the same labour market conditions.

The importance of labour market conditions may also be lessened in the public sector by political constraints and objectives. For example, strong public pressure for the settlement of a dispute in an essential service may force a government to accede to inflationary wage demands or to submit the dispute to binding arbitration. Public employers (especially political bodies) are sensitive to public opinion as well as to the wage demands of their employees.

The rate of wage change in the private sector is highly responsive to expected price inflation. There is little reason for public negotiators to behave differently from private ones. Labour will undoubtedly bargain to include all expected price inflation in wages ahead of time. However, owing to the uncertainty of future price inflation beyond two or three years and the likelihood of errors in forecasting, there will probably not be adequate provision for price inflation over the duration of the wage contract. Thus public as well as private sector employees may very well bargain to catch up for past inflation in periods of uncertain inflation.

In periods of rising incomes federal governments may have ample tax revenues to compensate public employees for price inflation, and this was especially so before the indexing of the income tax in 1973. Provincial and local governments are more circumscribed in their ability to set their own revenues and are therefore likely to try to avoid high degrees of advance compensation, although they may be prepared to compensate for inflation after it has occurred. Thus the timing and degree of compensation for

price inflation may also vary by jurisdiction. In summary, there is no a priori reason for excluding the traditional labour market and price variables when attempting to explain changes in public sector wages.

The findings

How insensitive were public sector wages to labour market conditions? What was the pattern of wage 'leadership' exhibited by the public sector? Was there excessive compensation for past and expected inflation? Were all subsectors of the public sector equally inflationary? These are the questions asked. In summary, here is what was found.

Unionization and the pattern of wages

Since the mid-1960s unionization has spread swiftly through the public sector, most notably at the provincial government level. Unions grew least (but still substantially) at the local government level. During 1967-75 the average increase in base wage rates in the Ontario public sector was one percentage point greater than wage increases in the private sector. Furthermore, among the four subsectors, education, health, local government, and provincial government, wage increases in the health subsection substantially led the others.

Factors behind wage increases

Wage rates in the Ontario public sector are determined by both prices and labour market conditions much as in the private sector. These results are substantially different from those obtained in a recent Economic Council of Canada study (Cousineau and Lacroix, 1978), which concluded that public sector wages in Canada were not very responsive to the usual labour market conditions. Price expectations play very similar roles in both sectors, while attempts to catch up for (uncompensated) past inflation are slightly stronger in the public sector. A comparison of the public sector in Ontario to that in the rest of Canada suggests that labour market conditions and price expectations have a stronger influence in Ontario. Furthermore, wages in the public sector are in part determined by the relative growth of the public sector compared to the private sector.

Although popular attention may be drawn to specific public sector contract settlements that seem 'out of line' with existing labour market

conditions and prices, most settlements are not of that type. Quite possibly just as many settlements in the private sector are equally 'out of line' but escape the attention of the media. It would therefore be wrong to try to control wages in the Ontario public sector on the ground that they behave differently from those in the private sector. Occasionally political imperatives may indeed influence a public sector contract, but the basic market forces remain dominant overall.

Wage transfer or spillovers

Is it true that public sector wages have been setting the pace for wages in the rest of the economy? We failed to uncover any significant spillover patterns between the Ontario private and public sectors. Wage spillovers do exist, but only within the public sector and not between the public and private sectors. Furthermore, wage spillovers do not appear to exist between different sectors within the government: the most important spillover is the history of past settlements in a particular subsector. Past settlements in the Ontario private sector or even the federal government have no perceptible influence on Ontario public sector wages. Finally there is no statistical support for the view that public sector wage changes spill over into private sector settlements.

Impact of the Anti-Inflation Board

Using the basic wage determination model with alternative specifications for the labour market variable to forecast wage settlements during the period of the AIB, we found that the actual wage changes were consistently below the forecast values for the eleven quarters from 1975 to 1978. On average, the predictions were too high by 2.3, 4.1, and 7.2 per cent respectively for 1976, 1977, and 1978. It is clear that wages in the Ontario public sector were constrained by the AIB.

THE PATTERN OF WAGE SETTLEMENTS IN THE ONTARIO PUBLIC SECTOR

The growth of collective bargaining

The public sector in Ontario may be subdivided into four subsectors: local or municipal government, hospitals and health, education, and pro-

vincial government employees. Although there are obvious policy and fiscal links between them, those four fields may be viewed as distinct public sectors. Three of them (local government, health, and education) can be further subdivided to reflect various occupations. For example the local government sector can be subdivided into firemen, policemen, garbage collectors, and other groups.

Collective bargaining in the public sector is relatively new in Ontario. In 1964 only two contracts, both in the health field, were negotiated under a collective agreement. In 1974, 151 contracts were signed. Figure 1 shows this dramatic growth. The decline in the number of contracts signed in 1973 and 1975 reflects the lengthening of contracts. For example in 1974, a year of strong expansion in collective bargaining in the health subsector, two-year contracts were signed for the first time.

In only nine years the proportion of employees in the Ontario public sector covered by union contracts grew from 4 per cent to almost 35 per cent. Unionization spread most rapidly at first in local government, where the proportion of total employees unionized rose to 25 per cent in 1968. The most remarkable increase occurred in the provincial government subsector from 1969 (5 per cent) to 1972 (42 per cent) (Figure 2).¹

Ontario public sector wage changes

Figure 3 compares contract settlements in the private and public sectors of Ontario. The contribution of each contract to the overall percentage change is weighted by the number of employees covered in the contract. On average, wages in the public sector rose by 1 per cent more a year than they did in the private sector.

The data used throughout this study consist of base wage rate settlements compiled by Labour Canada for 1966-75 as well as additional data on wage contracts in the hospital sector of Ontario. Bargaining groups of two hundred employees or more are included. Wage contracts containing cost of living allowance clauses (COLA) had to be excluded from our sample because of the diversity of such clauses (e.g. caps and triggers)

1 The rapid growth in public sector unionization appears to have had some impact on wage increases in the public sector. We calculate that from 1966 to 1975, a 1 per cent rise in the unionized proportion of the public sector labour force led to a 0.20 percentage point rise in the annual wage rate.

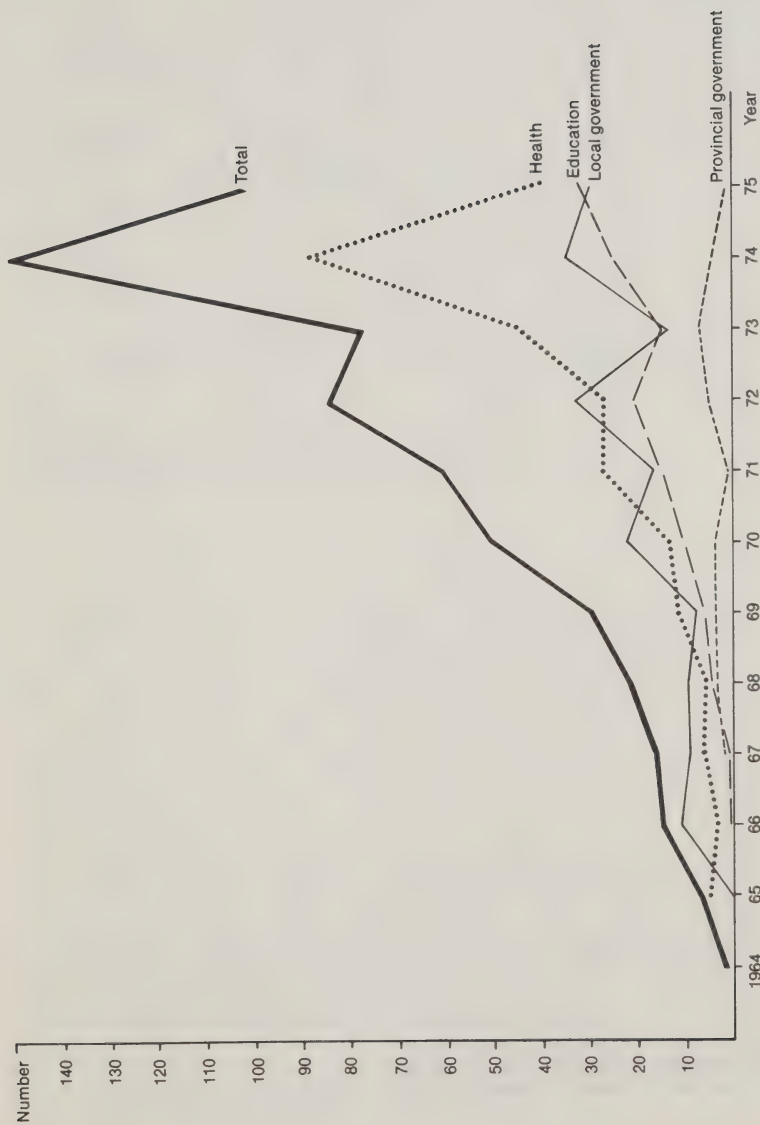


Figure 1

Number of contracts negotiated in the Ontario public sector (Source: Labour Canada and authors' data tape)

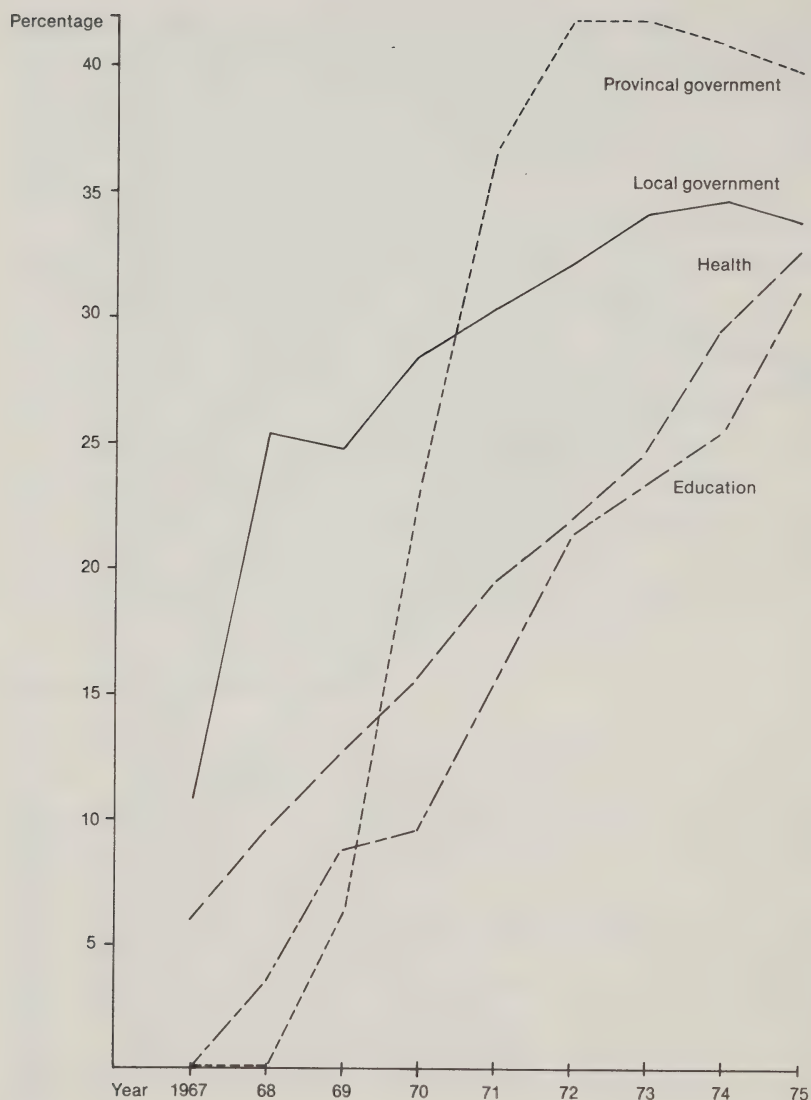


Figure 2

Percentage unionized to total Ontario public sector employees, by subsector (Source: Figure 1, Ontario government statistics, Statistics Canada)

Annual percentage change

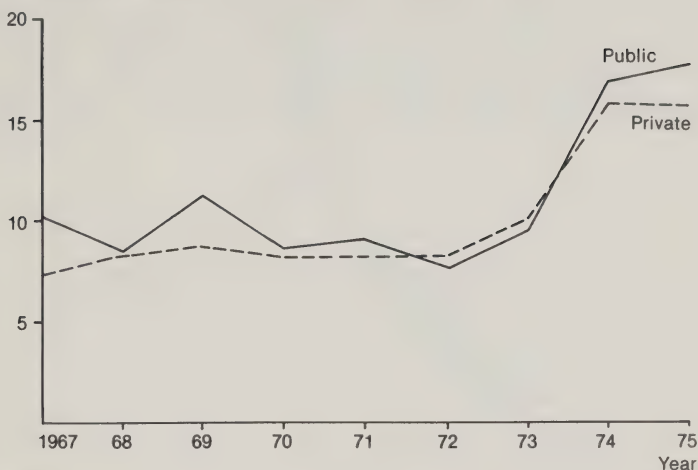


Figure 3

Public and private sector base wage rate changes in Ontario (Source: Labour Canada and authors' data tape)

and the impossibility of coding them to be consistent with non-COLA contracts.² While these data do not include fringe benefits, we believe they are a better measure of wages than, say, average hourly earnings, which among other things would include such cyclical elements as changes in the frequency of overtime premium labour. Although this may not be an important feature for the public sector, it would distort the comparisons with the private sector.

Most important of all for our statistical analysis is the fact that our micro-data capture important institutional features not reflected in traditional time-series data. For example a union may sign a multi-year contract with deferred increments. Since these are determined at the time the contract is signed, the explanatory variables in time-series analysis must be appropriately dated so that when the locked-in increment occurs

2 The number of contracts including COLA clauses was small: two in 1973, six in 1974, and fourteen in 1975.

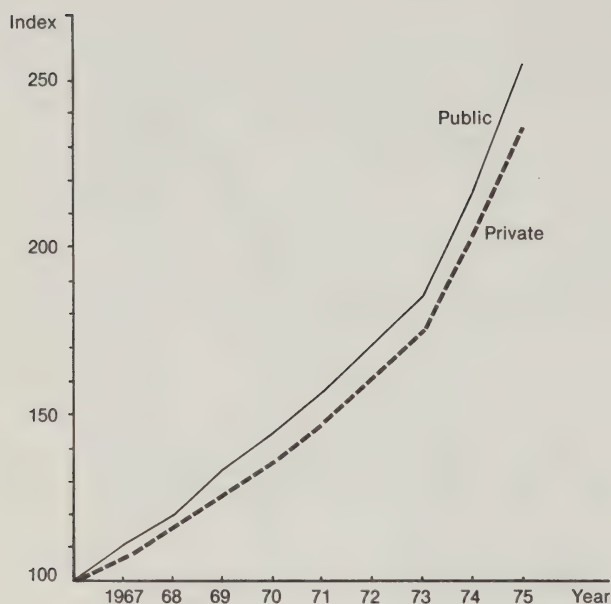


Figure 4

Index of public and private base wage rates in Ontario, 1966 = 100 (Source: Labour Canada and authors' data tape)

(say two years after the contract was signed) the explanatory variable in a wage equation will reflect the economic conditions at the time of the contract (two years earlier) and not those when the deferred increment becomes effective. Failure to specify these variable institutional features correctly can seriously affect the statistical wage analysis. An analysis of the micro-data before aggregating them avoids such problems.

Some idea of the 'gains' made by the public sector over this period can be seen in Figure 4. A private and public wage index with 1966 = 100.0 shows that by the end of 1975 the public sector index stood at 255.1 and the private sector index at 235.4.

One subsector stood out from the others (Figure 5). Wage increases in education, provincial government, and local government averaged 10.2, 10.8, and 10.1 per cent respectively. But for health the average increase was 13.6. With private sector increases averaging 10.0 per cent, the health sector was what pushed public sector wage increases slightly higher.

Local government

Collective agreements for firemen and policemen attract much public attention. Contracts involving these two groups extend back as far as 1967. Selecting that year as a base, the change in the wages of these two groups can be compared to those in the total public and private sectors. Figure 6 shows that firemen were able to achieve a slightly higher rate of growth in wages than policemen and other municipal workers. However, the gains of all three groups were not far off those typical of the public sector as a whole.

Health sector

The largest relative gains over the period 1968-75 were obtained by the non-nursing employees in the unionized health sector (Figure 7). By 1975 their wages had increased by 40 per cent more than the average increase in the public and private sectors! Increases of 25 and 33 per cent in 1974 and 1975 had caused this widening gap.

Summary

In the eight years before the establishment of the AIB, collective bargaining advanced rapidly in the Ontario public sector. Since our data exclude employees in bargaining units of less than two hundred, the growth of collective bargaining is slightly underestimated. On average, wages increased faster in the total public sector than in the private sector, but the difference was small. A single part of the Ontario public sector, health, was responsible for this difference. In the other sectors public and private wages moved together. It should be noted, of course, that in 1967 the health sector had the lowest base wage rate, about \$1.60

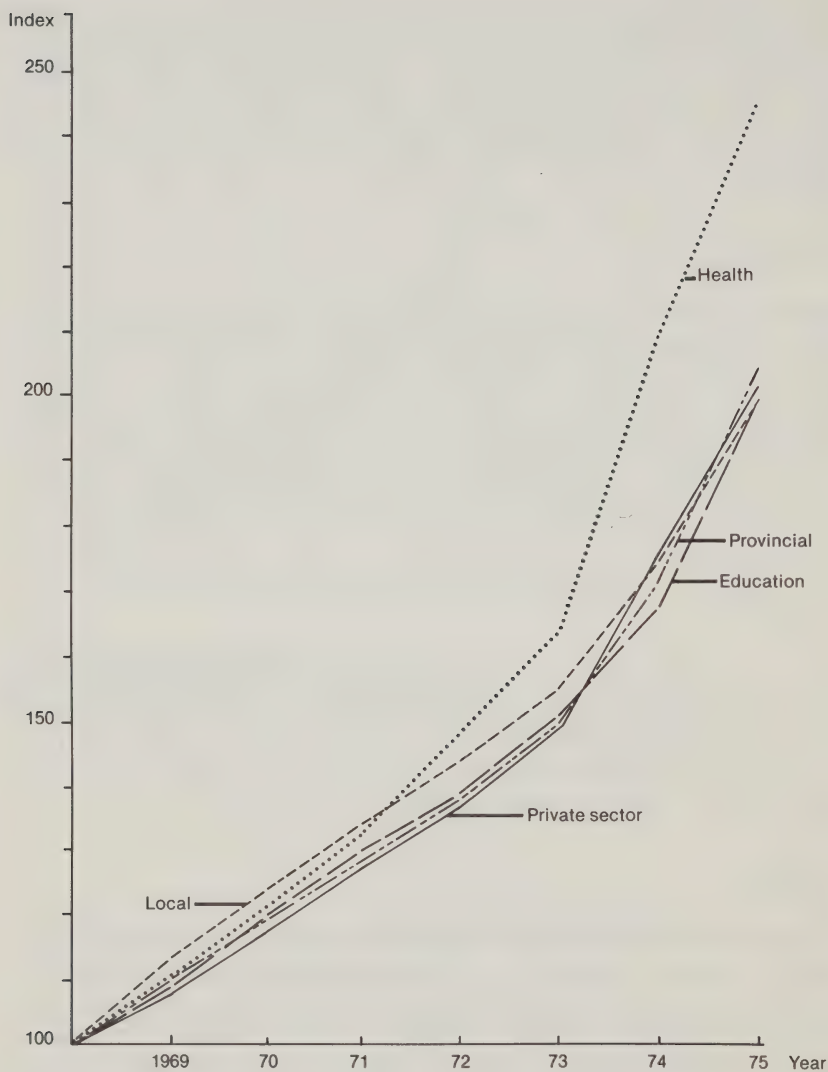


Figure 5

Index of private and public sector (by subsector) base wage rates in Ontario, 1968 = 100 (Source: Labour Canada and authors' data tape)

Note: The year 1968 was chosen as the base year because there were no contracts of any significance in the provincial public sector in 1967-8.

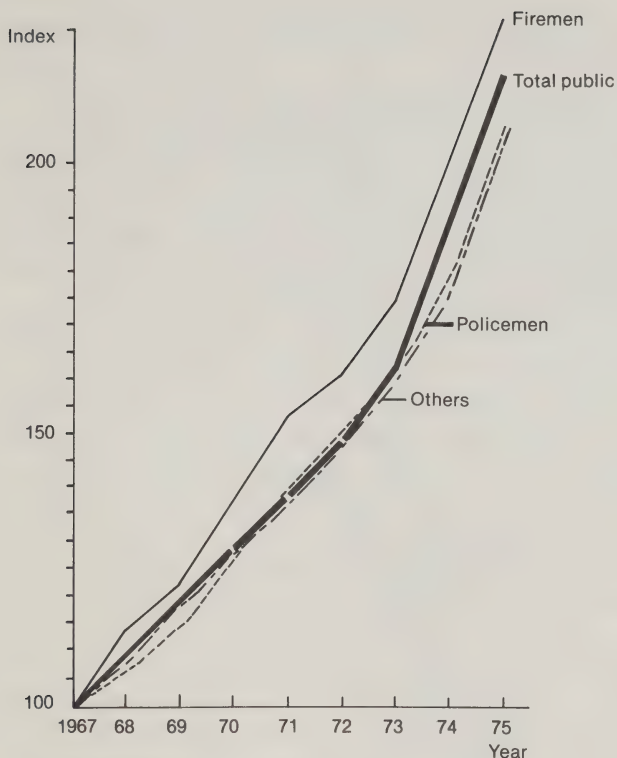


Figure 6

Index of base wage rates in local government subsectors (Source: Labour Canada)

an hour, while in the total public and private sectors the rate was approximately \$2.40 to \$2.70 an hour.

THE BASIC DETERMINANTS OF PUBLIC SECTOR WAGE CHANGES

As discussed earlier, there is no reason to assume that the determinants of public sector wage settlements differ from those found in the private sector. Our theoretical approach to wage determination in the Ontario public sector thus parallels that adopted by conventional wage studies of the private sector. In particular, we explore the influence of price in-

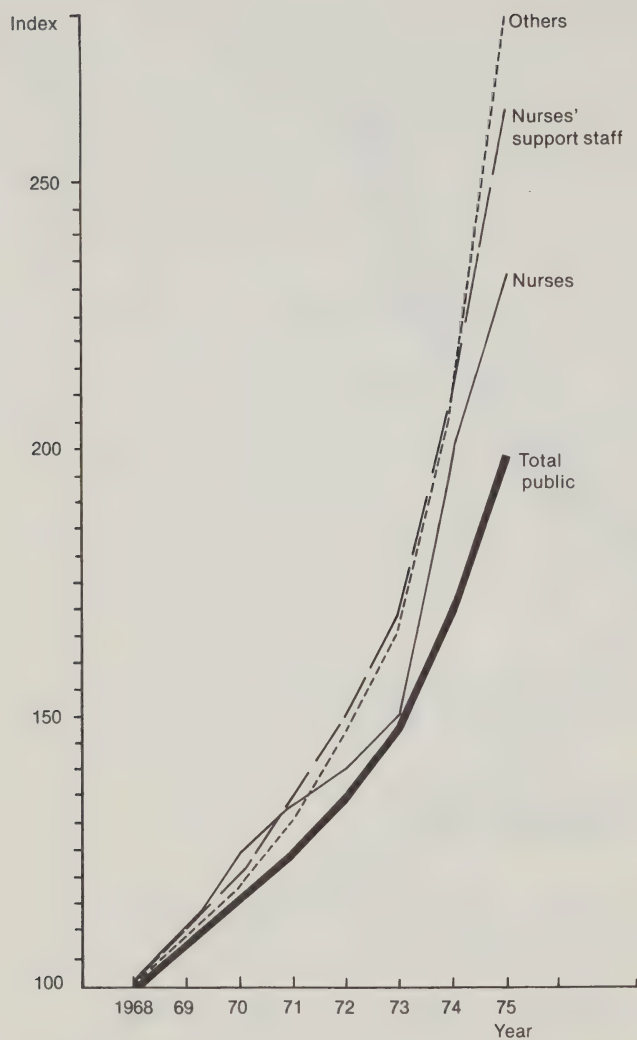


Figure 7

Index of base wage rates in health subsector
(Source: Ontario Ministry of Health)

flation and labour market conditions on the size of negotiated wage increases.

Thus, our wage determination model for the public sector consists of three basic determinants: price expectations, price catch-up, and labour market conditions. The proxy for price expectations assumes that the rate of (expected) inflation can be approximated by a distributed lag of its previous values and that both sides of the wage contract use the mean of these (distributed lag) forecasts to predict future rates of inflation.

Price catch-up is described in detail in Appendix A. The variable designed to represent catch-up tries to capture the extent to which a current contract provides compensation for unexpected (and uncompensated) inflation in the past contract period. For example, if workers negotiated their previous contract in anticipation of 5 per cent inflation, they will, if inflation turns out to be 8 per cent, bargain for the 'lost' 3 per cent in the current contract.

As proxies of labour market conditions, two broadly based labour market measures are used: the help wanted index and the job vacancy rate.³ Both variables are based on Ontario data in the quarter preceding the signing of a new contract.

We examine 610 wage settlements in the Ontario public sector that were negotiated in the 1966-75 (pre-AIB) period. The dependent variable is the total percentage change in base wage rates over the life of the contract expressed at an annual (compound) rate.⁴

Empirical results

Comparing the Ontario public sector wage equations to those for the private sector (details in Appendix A), one finds fairly similar price effects (particularly for price expectations). The main difference occurs for the labour market variable. In both cases Ontario labour market conditions appear to exert a stronger statistical effect on the public sector than on

3 Data before 1970 on vacancies were taken from an earlier study by Denton, Feaver, and Robb (1975).

4 A similar micro-scale methodology applied to Canadian public sector wage analysis has been previously employed by Auld, et al (1979b) and Cousineau-Lacroix (1978).

TABLE 1

'Average' annual negotiated wage changes

Inflation rates	Mean job vacancy rate	Mean job vacancy rate +1 standard deviation	Mean job vacancy rate -1 standard deviation
Public sector			
4%	9.88	10.73	9.03
7%	12.40	13.25	11.55
10%	14.92	15.77	14.07
Private sector			
4%	8.42	8.64	8.20
7%	10.67	10.89	10.45
10%	12.92	13.14	12.70

private sector wage changes. Thus, any reservation about the role of labour market conditions in determining public sector wages applies even more strongly to the Ontario private sector. This is in contrast to Cousineau and Lacroix (1978), who found that for the total Canadian public sector, labour market conditions played a very small statistical role in the determination of changes in the base wage rate.

To put these regression results in perspective we have computed the average predicted wage changes implied by our model (Table 1) for various values of the explanatory variables. For price inflation we have used three different rates and have assumed that the given inflation rate is correctly expected (i.e. the composite price coefficient is used). The labour market variable is set at its mean value as well as one standard deviation on either side of the mean value. Since both the labour market variables produced simpler results, only the job vacancy is presented in Table 1.

Perhaps the most striking conclusions are the 'high' values for average wage changes and the small quantitative role played by labour market conditions. Given average labour market conditions and a fully expected 7 per cent inflation rate, public sector wage changes are 'predicted' to be 12.4 per cent a year. Since it is highly unlikely that public

sector labour productivity is increasing by $5.5\frac{1}{2}$ per cent a year, such wage settlements would exert an inflationary effect on the Ontario economy. Even though Ontario private sector settlements in real terms also outpace labour productivity gains, the predicted wage changes are somewhat more modest. During the 1967-75 period, wage settlements in the Ontario public sector appear to have been one to two percentage points (a year) above those in the private sector for the same labour market and price inflation conditions.

Because of the inflationary implications for Ontario, our model has been re-estimated for the rest of Canada (excluding Ontario). The main structural differences between the public sector in Ontario and that in the rest of Canada (Table A.2) appear to be the stronger influence of price expectations in Ontario public sector wage settlements. Settlements outside Ontario appear to be dominated by price catch-up considerations. Finally, for average labour market conditions and fully anticipated price inflation Ontario public sector wage settlements are approximately 1 per cent a year higher than those obtained by public sector employees in the rest of Canada.

The four subsectors

Although similar wage inflation forces may be operating throughout the Ontario economy, each subsector has its own characteristics. As we saw, their rates of growth have varied. A more rapidly expanding subsector would probably experience an accelerated rate of wage inflation as it attempted to 'bid' labour resources away from other sectors of the Ontario economy.

The sample sizes in the subsectors are small.⁵ There are only twenty-seven contract observations in the provincial government subsector and only slightly more than one hundred in education. The statistical results are thus much weaker in the subsectors. However, a number of generalizations from Table A.2 are possible.

Labour market conditions remain important in determining the rate of wage inflation throughout the Ontario public sector. The faster the growth

5 The number of observations in each subsector can vary because of the lack of specific labour market data for certain years.

in the share of the labour force accounted for by the public sector, the higher the rate of change in public sector wages.

In the education subsector, price expectations play no significant role in explaining wage changes; the entire price effect is attributable to inflation catch-up, and the coefficients range from 0.87 to 1.04 depending on which labour market variable is used. In the health subsector both inflation expectations and inflation catch-up are significant, although the latter dominates. At the subsector level there is virtually 100 per cent compensation for fully expected price inflation.

For the provincial government subsector, wage compensation for price movements appears to be largely catch-up; wage-earners in the provincial government received compensation for about 60 per cent of past unanticipated price inflation. For local government the equation with the most significant labour market variable suggests that price expectations and catch-up are of roughly equal importance and that there is approximately 56 per cent compensation for fully expected inflation.

The four subsectors appear to respond differently to labour market conditions and price inflation (whether expected or unexpected). Unfortunately the small sample sizes do not permit more precise estimates of the determinants of wage inflation at that level. Henceforth our analysis is largely restricted to the Ontario public sector as a whole.

THE ROLE OF WAGE SPILLOVERS IN THE ONTARIO PUBLIC SECTOR

The previous sections have analysed two factors in the wage determination process in the Ontario public sector: consumer price movements (both expected and unexpected) and basic labour market forces. It has been assumed, however, that each wage settlement in the public sector is negotiated independently of all other recent wage settlements. No allowance was made for direct relationships or dependencies between bargaining groups because each group of employees was assumed to negotiate a contract in isolation from all other employee bargaining groups. We now discard that assumption and explore the direct role of wage interrelationships in the Ontario labour market.

Wage spillovers are an old theme in the literature on wage determination. Many wage spillover theories originated in the institutional school during the 1940s and early 1950s and emphasized the importance of

social, political, and institutional factors almost to the exclusion of economic and market forces. Most institutional spillover models focus on the internal structure and distribution of wage rates within occupational industrial groups and on the importance of maintaining a 'fair pattern' of wage differentials. If these institutional and historical wage relativities are disturbed, say by one bargaining group obtaining an abnormally high settlement, then on those theories a shock wave may occur as all bargaining groups try to re-establish the traditional wage differentials.⁶

While institutional wage spillover theories seem capable of almost infinite variation and have produced a vocabulary of their own,⁷ most of them make two key assumptions: (i) that the wage settlement of any bargaining group is linked to the settlements of other groups and (ii) that the links are principally social, political, and institutional rather than economic. In short, the wages of any group of workers are determined essentially by comparisons with the wages of other workers.

Obviously any analysis of wage determination in the public sector must be based on a thorough understanding of the institutional characteristics of this important labour market. However, the social, political, and institutional aspects of wage determination cannot be divorced from economics. Spillover theories ought to be grounded firmly in economic theory. One must be careful to distinguish between union bargaining demands and the economies of the employer/union bargaining process.

Though recent wage studies in economics have tended to dismiss wage spillovers, the concept is firmly embedded in the traditional microeconomic analysis of labour markets. In orthodox labour market analysis, the supply of labour to an employer is a function of his wage rate as well as the wage rate paid by all other employers. If another employer (say another hospital) were to raise its wages to attract more labour, then the supply of labour to the first institution would decline because a number of marginal workers would now prefer to work at the second hospital. Con-

6 An even stronger version of this institutional 'wage catch-up' hypothesis argues that all bargaining groups are continually trying to improve their position on the income distribution scale, causing a perpetual wage spiral.

7 For example: key bargains, key groups, pattern-wage setting, wage rounds, wage contours, orbits of coercive comparisons, leap-frogging, tandem relationships, historical relationships, wage relativities, and so on. For an excellent review and critique of institutional wage spillover theories, see Addison and Burton (1979).

sequently the first hospital will probably increase its wages to maintain its supply of labour. Thus the determination of wages for an employer is a function of a number of economic factors including the wages paid by all competing employers.

In such a 'Marshallian' model, one might argue, changes in the (excess) labour demand variable will capture the effect of changes in the wages paid by another employer, so that the effect of the spillover is buried in the labour market variable. However workers whose wages fall behind will not necessarily change jobs immediately. The costs to the 'marginal' individual of changing jobs may be large, and such employees may stay with their employer in the expectation of a wage adjustment in the next contract. In that case the potential excess demand attributable to an increase in competitive wages may not manifest itself completely in measurable labour market variables. Consequently a wage spillover variable may be necessary to capture this latent excess demand arising from a change in relative wages.

We begin by examining wage spillovers within the Ontario public sector and then turn to the more controversial issue of whether public sector wage settlements spill over into the private sector.

There are two problems in testing wage spillover theories. First, how does one know which previous wage settlements to include in the wage spillover model? Economic theory tends to operate in generalities (assuming 'n' different relative wage rates in the employer's labour supply function); the quantitative economist is forced to deal in specifics and with a severely limited number of possible explanatory variables. Secondly, even if the formidable problem of deciding which wage changes are relevant for a given group of workers is overcome, can one distinguish 'causation' from 'correlation'? For instance, two settlements may be 'determined' by the same set of economic factors and thus have virtually identical values; the second settlement will obviously correlate very highly with the first, but it may not be caused by the first. Both settlements may reflect a common set of causes such as price movements and general labour market conditions.

To prevent a common cause being mistaken for a wage spillover, one must test for a wage spillover in addition to other basic wage determinants. Therefore we add a wage spillover to our three basic wage determinants: price expectations, price catch-up, and Ontario labour

market conditions (see Eckstein and Wilson, 1962; Christofides, Swidinsky, and Wilton, 1980). For the last we continue to employ our three alternative proxies: the job vacancy rate, the help wanted index, and the relative growth rate in the Ontario public sector labour force. The econometric results are reported in detail in the Appendix B. The basic results can be summarized succinctly:

¶ When the reference group is similar to the sector whose base rate wages we are explaining, the spillover is strong and highly significant; wage spillovers at the disaggregated level are an important factor in explaining wage rate changes.

¶ Wage spillovers into the Ontario public sector from either the federal government sector or the Ontario private sector are not significant.

¶ Spillover variables based on arbitrated Ontario public sector settlements are highly important, which suggests that arbitrated public sector settlements seem to influence other public sector settlements. Public sector employers may feel compelled to follow arbitration decisions, perhaps believing them to be fair and equitable.

In recent years it has been widely believed that large wage settlements in the public sector will spill into the private sector. Such a view is usually based on the premise that the demands of private sector unions will emulate large government settlements. In other words, the influence of public sector wage settlements on private sector wage bargaining is thought to operate through political comparisons rather than through labour market mechanisms. The hypothesis of private sector emulation tends to ignore the demand side of the labour market and does not explain how the private sector employer (who is subject to the rigours of the market place) is coerced into acceding to the emulative demands of private sector unions.⁸

Nonetheless we have tested the notion of spillover from public to private sector wages. The empirical estimates are in Table B.3. The public sector spillover variable is again defined as the average of the last

8 We are not prepared to concede that the employers accede willy-nilly to emulative demands of unions or that civil servants and private sector unionized workers are interchangeable (in a Marshallian labour market sense).

four settlements in the entire Ontario public sector.

We find that regardless of the choice of labour market variable such spillovers do not seem to occur. Ontario public sector wage settlements do not affect private sector settlements.

Wage spillovers do exist, but only within the public sector; in fact, the more narrowly defined the spillover reference group, the sharper the statistical results. Wage spillovers do not appear to cross subsectors. The most important spillover determinant of wages in the Ontario public sector is the history of past settlements in any subsector, not past settlements in the Ontario private sector or the federal government sector.

THE IMPACT OF THE ANTI-INFLATION BOARD ON NEGOTIATED WAGE SETTLEMENTS IN THE ONTARIO PUBLIC SECTOR

On 14 October 1975 the minister of finance announced a prices and incomes policy which established guidelines for responsible social behaviour in determining prices and incomes of groups, together with machinery for administering these guidelines and ensuring compliance where necessary (Macdonald, 1975, 3).

This section considers how the imposition of wage controls may have affected negotiated wage settlements in the Ontario public sector. The analysis is restricted to the effects on negotiated wage settlements apart from any rollback ordered by the Anti-Inflation Board. Such rollbacks (data on which are not yet available) would exert an additional direct effect by lowering wage rates even more than the estimates derived below.

Three basic views of the potential impact of wage controls on negotiated wage settlements can be advanced. First, it may be argued that the AIB had no effect on wage settlements (other than the direct rollbacks). In other words, in negotiating wage contracts employers and unions simply behaved as if the AIB did not exist. Thus negotiated wage settlements submitted for AIB approval would be no different than they would have been in the absence of wage controls.⁹

9 Proponents of this position may also argue that any rollbacks will be reinstated in post-AIB contracts. In short the AIB will have no lasting effect on wage rates but will simply rearrange the time profile of wage movements.

Secondly, employees may have been coerced into negotiating lower wage settlements by the threat of a wage rollback. That is, because of its rollback powers the AIB may have indirectly reduced the size of settlements. In its extreme form such a position would contend that employers and unions that would otherwise have negotiated higher wage contracts have altered their behaviour by agreeing to wage contracts equal to the wage control guidelines.¹⁰ Since the Ontario government agreed to participate in the AIB policy, one might expect that in its capacity as an employer it would adhere to the wage guidelines.

Finally, it is possible that the AIB may have had a perverse effect on wages, causing higher settlements than might otherwise have been the case. The wage guidelines may have been set too high, thus functioning as a floor, rather than a ceiling, and pulling potentially lower settlements up to the guideline. Alternatively the employer and union may have adopted high negotiated settlements as a bargaining tactic in anticipation of an AIB wage rollback.¹¹

What is needed is a set of forecasts depicting the likely size of wage settlements in the absence of the AIB. In essence our empirical analysis must be counterfactual, based on what the rate of wage inflation in the Ontario public sector would have been had the AIB never been created. We assume that, in the absence of the AIB, settlements would have structurally resembled those in the previous decade. Using information from the pre-AIB period, wage settlements can be forecast for the 1975Q4-1978Q2 period to serve as benchmarks.

The counterfactual forecasts require also the specification of values for the three explanatory variables: labour market conditions, price expectations, and price catch-up. That is not easy to do. Wage and price controls were to be accompanied by restrictive monetary and fiscal policies (Macdonald, 1975). Such policies might themselves reflect the presence of the AIB and transmit it to the values for our explanatory

10 The wage guideline consists of three parts: (1) a basic protection factor (8, 6, 4 per cent) for the three AIB years; (2) a share in national productivity (2 per cent per annum); and (3) an adjustment for past wage and salary experience. The last factor, which is in fact a form of wage catch-up, is limited to +2 per cent per annum.

11 Since rollbacks were not expected to be 100 per cent, a high settlement might produce an AIB figure nearer what the two parties wanted originally.

variables. In that case the influence of the AIB would creep into our counterfactual forecasts. Unfortunately without a complete macroeconomic model that includes government policy reaction functions, it is difficult to avoid this problem.

The standard view of economists is that the labour market variable 'captures the effects of "demand management" policies on the inflation rate. The term "incomes policy" as conventionally used excludes demand management and stands in contrast to it. Hence variations in the inflation rate attributable to variations in the labour market variable are not to be regarded as effects' of incomes policy (Parkin, Sumner, and Jones, 1972). We adopt this strategy and use actual values for the explanatory variables during the AIB period.

Our counterfactual forecasts remain subject to at least two other sources of bias. First, our procedure for generating price expectations again assumes the absence of an AIB. If the existence of an anti-inflation program altered beliefs about future inflation rates, then our estimate of price expectations (and our forecasts) will be inaccurate. However, the government's announcement of an 8 per cent target inflation rate for 1976 probably did little to lower price expectations. If anything, it might have reinforced the view that inflation would be persistent (and that 8 per cent perhaps represented an unrealistic government target). Evidence from other countries on this point is mixed. Carlson and Parkin (1975) and de Menil and Bhalla (1975) found no influence by controls on inflation expectations in Great Britain and the United States respectively. On the other hand McGuire (1976) found that President Nixon's control program did have some effect on price expectations.

A potentially more important source of bias in our impact estimates would arise from the success of an incomes policy. If the AIB was able to lower the rates of wage inflation and if these lower rates were passed through to lower rates of price inflation (and subsequently to lower price expectations), our two price variables based on actual data will understate the rate of price inflation that would have occurred in the absence of the AIB. Thus our counterfactual forecasts may be systematically biased downwards, and our estimates of the effect of the AIB may be understated. Given the lags (caused by the length of the bargaining cycle) in translating new AIB-period contracts into aggregate wage and price levels,

this feedback effect should not bias our results seriously until well into the second year of the AIB.

The 956 Ontario public sector contracts signed during the AIB period are forecast individually. Recall that all equations have been estimated in the period immediately before the establishment of the AIB. To facilitate comparisons, these wage settlements have been grouped together into quarterly averages, weighted by the number of employees covered in each contract. Figure 8 compares the forecasts for both labour market variables with actual wage settlements in the Ontario public sector.

For both labour market variables, the actual negotiated wage changes during the three years of wage controls were much less than our counterfactual forecasts. Clearly the AIB cannot take credit for the entire decline. Much of it would have occurred without an incomes policy. Similarly, the upturn in the structural wage forecasts in 1977 is due, not to any incomes policy, but to a rise in the price expectations and price catch-up components of the wage equation.

Despite this downward trend in the structural forecasts in the AIB period, all eleven quarterly averages for actual Ontario public sector wage settlements lie below both the forecast values. In the Ontario public sector, the average over-prediction is approximately 2.3 per cent a year in the first year of the AIB, 4.1 per cent in the second year, and 7.2 per cent in the third year. The systematic nature of the over-prediction errors leaves little doubt that the presence of the AIB had a substantial dampening effect on wage settlements in the Ontario public sector in addition to any direct rollback effects.

It is important to emphasize that this effect is revealed by an examination of base wage rates in union contracts and that such effects are only applicable to new contracts negotiated in the AIB period. To the extent that many civil servants were locked into wage contracts signed before the establishment of the AIB, no AIB influence could occur for the first year or so of the incomes policy.

Though our AIB impact results for the Ontario public sector appear to be particularly well founded and in general agreement with the findings of three earlier studies for Canada (Auld et al., 1979b; Christofides and Wilton, 1979), they are subject to several qualifications. First, they apply unions (and associations) that signed AIB contracts without a COLA

Annual change in base wage rate (%)

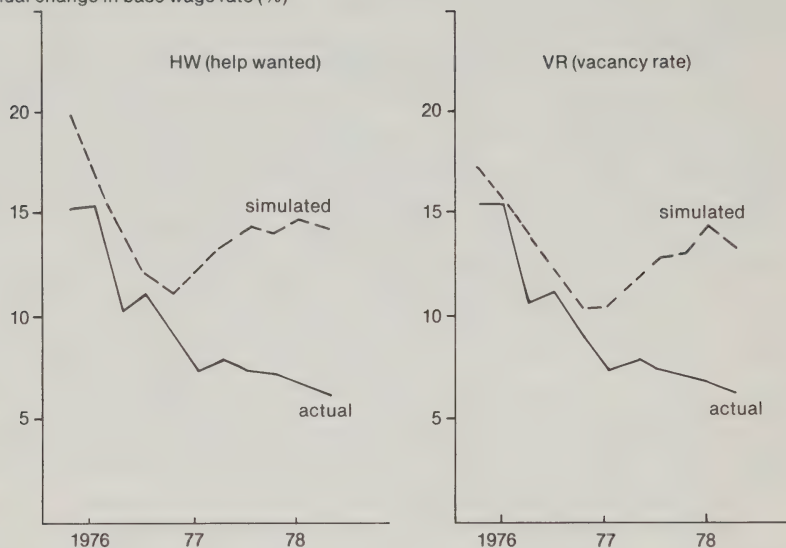


Figure 8
The effect of the Anti-Inflation Board

clause. While we may speculate that similar effects would have been experienced in the rest of the Ontario public sector, no evidence on the question is available. Furthermore, our findings pertain to base wage rates only and exclude such factors as wage drift and fringe benefits. While the AIB attempted to monitor total compensation within the bargaining group, our results measure only base wage rates and may not be entirely applicable to workers paid above that level. Finally, as with all AIB impact studies, we assume the wage structure of the decade before the AIB persisted through the 1970s. If the pre-AIB wage structure was not stable, our counterfactual forecasts are unreliable.

Nevertheless, the AIB seems to have substantially affected Ontario public sector wage settlements. By the third year of the AIB program, wage settlements before any rollbacks were approximately 7 per cent a year below what they would have been without the AIB. The crucial issue is whether these restraining effects will persist or reverse themselves in the post-AIB era.

APPENDIX A

Ever since the publication of Phillips's path-breaking article on wage inflation, models of wage determination have invariably included among the list of explanatory variables the rate of change of a price index along with a proxy for labour market conditions. Phillips (1958) speculated rather informally about the relevance of price level changes for wage determination; and Lipsey (1960), Dicks-Mireaux and Dow (1959), Eckstein and Wilson (1962), Perry (1966), and others all included the rate of change of some price index in their wage models. Even though the precise mechanism through which price movements affect wage rates was never made clear, these authors did distinguish between real and nominal magnitudes, drawing attention to notions of price catch-up, usually in a bargaining context.¹² Although Phelps (1967) and Friedman (1968) did not introduce the price variable into their wage determination models, they did provide a much more precise theoretical model for the role of prices in the wage-determination process. In particular they emphasized 'forward-looking' behaviour on the part of participants in the labour market and argued that the expected rate of inflation should enter the wage equation before the fact with a theoretical coefficient of unity. If workers expect the rate of inflation to rise in the contract period ahead, they will demand and obtain a larger current wage settlement to compensate them for the higher inflation rates that they expect. The Phelps-Friedman model gives rise to the following equation:

$$\dot{w} = a\dot{P}^e + \delta X,$$

where \dot{w} is the rate of change in base wage rates, \dot{P}^e is price expectations, and X represents other explanatory variables such as labour market conditions.

The application of the Phelps-Friedman expectation model to the wage-determination process raises one interesting (but often overlooked) question: what happens to the unexpected gains or losses that are attributable to incorrect price expectations? It is important to note that no

12 When inflation is rapid, the sense of inequity creates strong member support of union leaders' wage demands or pressure on the leaders to 'catch up' (Eckstein and Wilson, 1962, 391).

matter what the cause of price expectations, be it rational or not, such expectations are usually in error. Furthermore, learning to make better forecasts of future prices on the basis of knowledge gained from one's past errors is not the same thing as correcting past forecasting errors. Despite the explicit treatment of expected inflation, the Phelps-Friedman model provides no direct mechanism for the individual firm (or union) to rectify its incorrect past price expectations by simply adjusting the wage rate.

In the Phelps-Friedman model, employees are assumed to bargain vigorously in advance for 100 per cent of expected price increases but to let labour market conditions correct later for any unexpected inflation; i.e. catch-up bargaining does not occur. However, this is implausible. During 1972-5, unexpected inflation during a three-year Canadian wage contract was about 15 per cent. It would be naive to assume that during the 1975 contract negotiations labour forgot this loss. For this reason, a number of writers, e.g. Turnovsky (1972), Turnovsky and Wachter (1972), Johnston and Timbrell (1973), de Menil and Bhalla (1975), Cousineau and Lacroix (1978), Riddell (1979), and Wilton (1977) have included in their wage equations a variable capturing unexpected inflation to reflect such bargaining demands.

However, a second, possibly more fundamental, difficulty exists with the indirect market correction mechanism outlined above. In a world of long-term contracts that fix the nominal wage rate, it is unlikely that forecasting errors will be fully reflected in the unemployment rate or the help wanted index. The actual responses of both employer and labour force to unexpected inflation will not be as swift and complete as the indirect mechanism suggests. The cost to the employee of quitting and looking for another job may exceed the gains from receiving a higher real wage rate elsewhere. Indeed, a higher real wage rate will only exist if competing employers have not experienced a similar burst of unexpected inflation, or if, through bargaining at a different time, they have already accommodated unexpected inflation in their nominal wage rates. In view of the long-run relationships between employers and their employees, labour may 'hang-in' till the next contract negotiation in anticipation of a catch-up and will quit only if such a correction fails to occur. If its own labour force does not quit, the employer will have no need to incur the costs of hiring and training additional workers. If, at the next contract negotia-

tion, the employer raises the nominal wage rate to satisfy the existing labour force, any new workers will, in any case, become redundant. Similar arguments can be made for unexpected deflation.

In the period of disequilibrium caused by unexpected inflation during the life of the contract, both the employer and its employees may be off their true labour demand and supply curves. The excess labour demand arising from unexpected inflation is real but latent, and the observable measures of labour market conditions may not reflect the full extent of the actual disequilibrium in the labour market. In fact for any given employer with his own particular timing of wage contracts, the observable measures of labour market conditions may be very misleading. An employer may choose to 'satisfy' his existing labour force after a bout of unexpected inflation rather than to replace them from the pool of unemployed (but untrained) workers who may be available at the inappropriate nominal wage. For all these reasons it is reasonable to take account of catch-up bargaining.

In accordance with the above discussion, the following model will be tested:¹³

$$\dot{W}_t = C_0 + \alpha \dot{P}_t^e + \beta \{ (\dot{P}_{t-1}^A - \alpha \dot{P}_{t-1}^e) \ell_{t-1} \} / \ell_t + \gamma X_t,$$

where \dot{W}_t is the annual (compound) percentage change in the base wage rate during the current contract period; \dot{P}_t^A is the actual percentage change in the consumer price index over the entire previous contract at an annual rate; \dot{P}_t^e is the expected percentage change in the consumer price index over the current contract at an annual rate (to be explained shortly); X_t is an excess-labour-demand variable; ℓ_t is length of current contract in years; and ℓ_{t-1} is length of previous contract in years. For expositional purposes, the expression in square brackets following the parameter β will be referred to as an uncompensated past inflation, or price catch-up (\dot{P}^{cu}). If the parameter α is zero, i.e. there is no provision for future inflation, then \dot{P}^{cu} will be the actual rate of inflation over the previous contract ($\dot{P}_{t-1}^A \cdot \ell_{t-1}$) divided by the current contract length (ℓ_t) to convert this shortfall into an annual percentage. A positive

13 For further discussion of this model see Auld et al. (1979a) and Christofides and Wilton (1978).

value of α would reduce the potential size of \dot{P}^{cu} , although even if α were unity, \dot{P}^{cu} would still exist if past price expectations proved erroneous. The model is estimated using OLS, with non-linear parameter restrictions that provide a consistent or identical estimate of α for both appearances in the wage change equation. With our micro-data base, the specification of price catch-up can be much more precise than that employed by other authors who have analysed aggregate, time-series data.¹⁴ As defined in the equation above, our proxy for price catch-up (\dot{P}^{cu}) allows for both unexpected inflation and the possibility that not all of the expected inflation is incorporated into wages ahead of time (i.e. $\alpha < 1.0$).

Empirical results

Table A.1 presents econometric estimates for our basic wage-determination model as applied to the total Ontario public sector. For comparative purposes we also present econometric estimates for the same wage-determination model applied to wage contracts in the Ontario private sector in the same (pre-AIB) period: 1966-75.

Both price expectations and price catch-up effects are highly significant in Ontario public sector wage negotiations. If one assumes that inflation is fully anticipated (i.e. $\dot{P}^e = \dot{P}^A$) and contract length remains constant, the composite price effect can be computed as the sum of the two price coefficients minus their cross-product.¹⁵ Under such conditions

14 Turnovsky (1972) and de Menil and Bhalla (1975) have constrained the α in their catch-up term to be unity but have estimated the α coefficient on current price expectations freely. While their specification does capture 'unexpected' inflation, our proxy provides a measure of 'uncompensated' past inflation. Finally, the values of successive contract lengths (the ℓ s) are crucial in determining the magnitude of uncompensated inflation and the period of time for which this shortfall can be apportioned. In our sample, contract length varies considerably both across micro-units and over time (for the same micro-unit). All the above-mentioned studies that have included price catch-up have of necessity assumed constant contract length in an aggregate framework.

15 Considering wages and prices only, substituting for price catch-up in the wage equation one obtains

$$\dot{w} = \alpha \dot{P}^e + \beta \dot{P}^A - \alpha \beta \dot{P}^e$$

and in long run equilibrium, since actual equals expected inflation,

$$\dot{w} = \alpha \dot{P}^A + \beta \dot{P}^A - \alpha \beta \dot{P}^A.$$

TABLE A.1
Econometric estimates for the basic wage-determination model

Const.	\dot{p}^e	\dot{p}^{cu}	VR	HW	UR ⁻¹	S.E.E.	R ⁻²
Ontario public sector							
4.107 (4.20)	0.636 (3.64)	0.561 (5.69)	0.032 (1.52)			6.880	0.326
1.979 (1.35)	0.510 (3.00)	0.571 (6.75)		1.411 (2.43)		6.856	0.331
Ontario private sector							
4.795 (14.36)	0.609 (6.84)	0.361 (2.33)	0.817 (1.04)				0.423
4.447 (7.51)	0.603 (6.80)	0.364 (7.42)		0.693 (1.12)			0.464

NOTE: t-statistics in parentheses

approximately 80 per cent of a fully anticipated inflation will be incorporated into Ontario public sector wages.¹⁶

The results for the two broad measures of Ontario labour market conditions are not quite as strong. Both the labour market variables are correctly signed, but only the help-wanted index variable is significant at the 0.05 level.

Econometric results for both the public (non-federal) and private sectors (excluding Ontario) are presented in Table A.2. A conventional F-test reveals that the wage equations in the public sector, excluding Ontario, are significantly different from the wage equations estimated for the Ontario public sector.¹⁷

Table A.3 presents the econometric results for our basic wage determination model applied to the four subsectors of the Ontario public sector, along with the total public sector equations. In each case four different measures of labour market conditions are used. The first two measures,

16 The change in the rate of wage increase with respect to a change in inflation is

$$\alpha + \beta - \alpha\beta$$

17 Computed f-values of 10.44 for the HW labour market variable and 19.40 for the JV variable.

TABLE A.2
Basic wage determination model for Canada excluding Ontario

Const.	\dot{p}^e	\dot{p}^{cu}	HW	VR	S.E.E.	\bar{R}^2
Non-federal public sector						
2.620 (3.34)	0.009 (0.08)	0.865 (12.95)	0.787 (2.53)		5.44426	0.485
4.661 (7.73)	0.170 (1.89)	1.018 (17.19)		-0.004 (0.90)	5.47511	0.479
Private sector						
3.905 (8.15)	0.403 (5.99)	0.640 (14.91)	0.618 (3.12)		4.70541	0.451
4.912 (15.58)	0.484 (8.36)	0.708 (19.34)		0.0095 (1.60)	4.71706	0.446

NOTE: t-statistics in parentheses

the Ontario vacancy rate (VR) and the Ontario help-wanted index (HW), repeat the results presented in Table A.1. In an attempt to capture a more specific representation of the public sector labour market, two additional labour market variables are created. The first is defined as the percentage change in the ratio of total Ontario public sector employees to the total Ontario labour force (LFTP). As the Ontario public sector expands compared to the entire Ontario economy, upward demand pressure on public sector wages will probably be exerted to draw workers into the public sector. The second variable is constructed in a similar manner except that the numerator of the ratio is disaggregated to the subsector in which the specific wage negotiations take place (LFDP). In other words, separate ratios are constructed for local governments, health, education, and the provincial government (each as a percentage of the total Ontario labour force).

First, in terms of the four potential labour market variables, the Ontario-wide measures for job vacancies and for help-wanted fare very poorly. In six of eight cases VR and HW have the wrong sign at the subsector level. Only in the health sector (which is the largest of the (subsectors) are these two Ontario-wide labour market variables 'correctly' signed. Whether one can attribute this anomalous result to the smallness

TABLE A.3
Econometric results

Const.	\hat{p}^E	\hat{p}^{cu}	VR	HW	LFTP	LFDP	S.E.E.	\bar{R}^2	η
Total Ontario public sector									
4.107 (4.20)	0.636 (3.64)	0.561 (5.69)	0.032 (1.52)				6.880	0.326	610
1.979 (1.35)	0.510 (3.00)	0.571 (6.75)		1.411 (2.43)			6.856	0.331	610
5.460 (10.79)	0.946 (7.64)	0.639 (6.16)			0.457 (2.74)		6.953	0.329	586
5.651 (10.99)	0.767 (6.31)	0.614 (6.84)				-0.163 (1.48)	6.949	0.325	597
Health sector									
-0.962 (0.73)	0.426 (2.12)	0.766 (5.82)	0.133 (5.07)				6.604	0.532	300
-7.410 (3.80)	0.181 (0.87)	0.748 (7.13)		4.818 (6.43)			6.437	0.550	300
7.003 (14.13)	1.008 (9.89)	1.486 (9.29)			0.645 (2.69)		6.900	0.495	291
6.798 (13.14)	0.979 (9.15)	1.385 (8.90)				0.222 (1.13)	6.933	0.484	300
Education sector									
11.381 (4.75)	0.407 (1.33)	1.040 (6.49)	-0.114 (2.54)				4.925	0.517	115
15.152 (4.66)	0.450 (1.62)	1.026 (6.99)		-3.478 (3.02)			4.862	0.529	115
5.668 (5.79)	-0.244 (1.36)	0.874 (11.18)			0.239 (0.84)		5.175	0.487	113
5.812 (6.19)	-0.178 (0.94)	0.880 (11.05)				0.240 (1.22)	5.113	0.479	115
Local government sector									
10.484 (9.81)	0.702 (3.60)	0.503 (4.66)	-0.099 (4.01)				3.378	0.365	168
12.411 (8.62)	0.480 (2.88)	0.460 (5.45)		-2.250 (3.99)			3.427	0.347	168
6.171 (8.68)	0.373 (2.38)	0.303 (3.81)			0.589 (3.53)		3.569	0.338	155
7.055 (10.16)	0.072 (0.49)	0.365 (5.39)				0.033 (0.19)	3.708	0.286	155

TABLE A3 (continued)

Const.	\hat{p}^E	\hat{p}^{cu}	VR	HW	LFTP	LFDP	S.E.E.	\bar{R}^2	η
Provincial government sector									
10.562 (4.19)	0.341 (0.98)	0.872 (4.72)	-0.103 (2.00)				2.751	0.592	27
12.589 (2.70)	0.228 (0.56)	0.767 (4.41)		-2.427 (1.42)			2.884	0.551	27
5.390 (4.78)	0.037 (0.13)	0.648 (5.90)			0.598 (2.08)		2.778	0.583	27
5.465 (4.70)	-0.078 (0.30)	0.639 (6.11)				0.304 (1.94)	2.810	0.574	27

NOTE: t-statistics in parentheses

of the sample in the other three subsectors or to a misspecification of the labour market variable is a moot point. However the two 'new public sector' labour market variables fare considerably better. In all eight subsector cases they have the correct sign, and four of the eight are significantly positive.

While these subsector wage equations appear to be different in the four subsectors, we nonetheless computed an F-value to test for parameter homogeneity. For all four labour market variables we can reject the hypothesis that the set of parameter values in the four subsectors are statistically the same.¹⁸

APPENDIX B

There are two main issues to be resolved in the specification of a wage spillover variable: (1) the definition of the reference set of wage settlements from which wage spillovers emanate and (2) the selection and weighting of individual elements from within the reference set. With respect to the latter problem, we have experimented with a number of weighting schemes (unconstrained and constrained polynomial functions of various kinds).¹⁹ Since our empirical results are rather insensitive to the

18 The computed F-values are 31.0, 33.5, 24.3, and 23.1 respectively.

19 For further discussion of various weighting models, see Christofides, Swidinsky and Wilton (1980).

differences in the weights applied to previous settlements, we present only the results for the spillover variable model in which the last four settlements from the reference group were included with equal weights (i.e. a simple average of the last four settlements in the reference group). However the particular definition of the spillover reference group is of considerable importance. Five different definitions of the appropriate reference set for wage spillovers in the Ontario public sector were examined, and our empirical results are organized accordingly.

The first, and most obvious, spillover hypothesis to test is whether Ontario public sector wage settlements are influenced by past settlements within the total Ontario public sector. The results of the upper portion of Table B.1 suggest that this is the case. Regardless of which labour market variable is selected, a spillover variable based on the total Ontario public sector (\dot{W}^{TP}) is highly significant and exhibits a fairly large coefficient (37 to 48 per cent). In addition, the inclusion of this wage spillover variable increases the strength of the price catch-up effect and of the broadly based labour market variables (VR and HW). The only serious deterioration in the basic wage determination model occurs for the price expectations variable. That can probably be attributed to the fact that the wage spillover variable inadvertently adds an element of 'wage expectations' that may dominate the postulated price expectations effect in the regression model.²⁰

While a spillover variable based on recent settlements in the total Ontario public sector adds significant explanatory power to our public sector wage equations, it can be argued that a spillover reference group so defined should be further subdivided to the subsector level within the Ontario public sector. For example, the relevant spillover reference group for the health subsector may consist of past settlements restricted to the health subsector. As discussed above, the results presented in the upper portion of Table B.1 define the spillover reference group as the entire public sector and thus allow spillovers to cross subsector boundaries (i.e. the last four settlements for any given public sector wage contract may occur anywhere in the Ontario public sector). An alternative spillover

20 In addition, the only serious multicollinearity problem in the regression model concerns the price expectations variable and the broadly based labour market variables (VR and HW).

TABLE B.1
Ontario public sector: spillovers within the public sector

Constant	\dot{P}^E	\dot{P}^{cu}	VR	HW	LFTP	\dot{W}^{TP}	\dot{W}^{DP}	S.E.E.	\bar{R}^2
4.22 (4.06)	0.655 (3.66)	0.557 (5.46)	0.0302 (1.37)					6.984	0.320
0.57 (0.27)	-0.046 (0.12)	0.655 (5.41)	0.114 (2.42)			0.480 (6.99)		6.718	0.371
2.13 (1.40)	0.525 (3.02)	0.566 (6.48)		1.361 (2.27)				6.962	0.324
-4.50 (1.35)	-0.194 (0.53)	0.659 (6.24)		3.951 (3.00)		0.479 (7.11)		6.689	0.376
5.460 (10.79)	0.946 (7.64)	0.639 (6.16)			0.457 (2.74)			6.953	0.326
5.94 (8.55)	0.547 (3.29)	0.905 (7.43)			0.372 (1.48)	0.369 (5.34)			
-15.44 (2.48)	-4.234 (3.03)	0.697 (9.36)	0.508 (3.52)				0.813 (22.09)	5.148	0.630
-26.851 (3.17)	-3.555 (3.22)	0.735 (9.65)		12.881 (3.83)			0.795 (22.08)	5.150	0.630
3.546 (1.96)	-0.171 (0.53)	1.319 (6.97)			0.259 (0.50)		0.756 (21.25)	5.302	0.608

NOTE: LFTP is the percentage change in the ratio of the Ontario public sector labour force to the total labour force; \dot{W}^{TP} is the percentage change in the base wage rate in the total Ontario public sector; and \dot{W}^{DP} is the percentage change in the base wage rate in the disaggregated public sector.

hypothesis would restrict the reference group to the subsector to which the given wage settlement (the dependent variable) belongs. In other words, past health sector contracts only spill into future health contracts, past education contracts only into future education contracts, and so on.

The lower portion of Table B.1 presents results for the wage spill-over hypothesis in which the reference group is subdivided to the specific subsector to which the given wage settlement belongs (\dot{W}^{DP}). While the empirical results are qualitatively similar to those presented for the total public sector reference group, they are much stronger statistically. In particular, the coefficient on the spillover variable has risen to approxi-

TABLE B.2
Ontario public sector: alternative spillover hypotheses.

Constant	\bar{R}^2	\dot{P}^E	\dot{P}^{cu}	VR	\dot{W}^{FED}	\dot{W}^{ARB}	\dot{W}^{PRIV}	S.E.E.
4.22 (4.06)	0.655 (3.66)	0.557 (5.46)	0.0302 (1.37)					6.984 0.320
4.20 (3.71)	0.627 (3.25)	0.597 (3.49)	0.0340 (1.42)		0.058 (0.27)			6.990 0.319
-1.80 (0.62)	-0.461 (0.96)	0.781 (6.14)	0.153 (2.56)			0.577 (8.86)		6.588 0.395
4.43 (4.81)	0.726 (4.53)	0.485 (4.61)	0.022 (1.11)				-0.128 (0.98)	6.985 0.319

NOTE: \dot{W}^{FED} is the percentage change in the base wage rate in the federal public sector; \dot{W}^{ARB} is the percentage change in the base wage rate in any Ontario arbitrated public sector contract; and \dot{W}^{PRIV} is the percentage change in the base wage rate in the Ontario private sector.

mately 75-80 per cent and has a t-score of above twenty-one! Again the price catch-up variable and the Ontario labour market variables (VR and HW) exert strong significant effects on public sector wage determination. Collinearity problems between price expectations, the wage spillover variable, and the labour market variables (VR and HW) are the likely cause of the peculiar coefficients on the intercept and the price expectations variable. Thus, wage spillovers from past public sector wage settlements are an important additional factor in Ontario public sector wages; the strongest empirical results were found in spillover reference groups, subdivided to the specific subsector level.

Even though the empirical results are very strong statistically and correspond to our prior beliefs about the spillover process, we nonetheless experimented with three additional definitions of spillover reference group: federal government bargaining groups in the province of Ontario (\dot{W}^{FED}); arbitrated contracts within the Ontario public sector (\dot{W}^{ARB}); the Ontario private sector (\dot{W}^{PRIV}). In each case we constructed a spillover variable that was the average of the last four settlements in the particular reference group. Since the results for the various labour market variable

specifications were qualitatively very similar, Table B.2 shows only the results for the Ontario job vacancy rate specification of our basic model.

APPENDIX C

The forecast impact results are based on the assumption that the same set of wage explanatory variables are relevant in both the pre-AIB and the AIB period. However, as Lipsey and Parkin (1970) point out, by imposing wage controls policy-makers may 'seek to substitute' a 'wage norm' for the structural wage relationship described above. In other words the wage guideline may become an important additional variable in the wage-bargaining process.

To illustrate the Lipsey-Parkin hypothesis, the pre-AIB Phillips curve (assuming a correctly anticipated inflation of 8 per cent) has been plotted in Figure C.1 as the rising solid line labelled \dot{W}^S . The AIB wage guideline in the first year of operation (10 per cent) is shown as the horizontal line \dot{W}^G . For all points to the right of the intersection of these two lines (point C), the goal of incomes policy is to pull down potential structural wage settlements to the guideline ceiling. To measure the effectiveness of the policy one can compute the percentage of the gap between the potential structural wage settlement and the guideline that is actually removed by the presence of the AIB. In the figure, broken line \dot{W}^A represents an incomes policy that is 50 per cent effective. However, as Lipsey and Parkin note, if the wage guideline is set at a value in excess of the potential structural wage settlement then the guideline may act as a floor pulling actual wage settlement up towards the wage guideline. Thus the precise value of the wage guideline is of crucial importance, and a wage guideline that is set at a value exceeding the average potential (structural) wage settlement may actually accelerate wage inflation.

The Lipsey-Parkin rotation hypothesis can be represented by the following equation:

$$\dot{W}^S - \dot{W}^A = \lambda[\dot{W}^S - \dot{W}^G],$$

or

$$\dot{W}^A = \lambda\dot{W}^G + (1 - \lambda)\dot{W}^S,$$

where \dot{W} is the actual micro-wage settlement, \dot{W}^G is the wage guideline

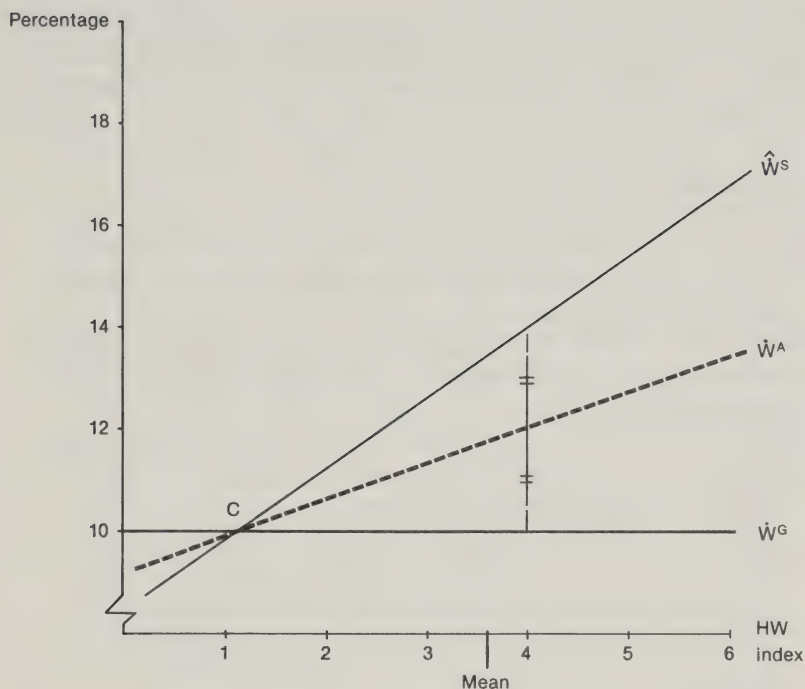


Figure C.1
Rotation hypothesis

where \dot{W}^A is the actual micro-wage settlement, \dot{W}^G is the wage guideline computed for each contract,²¹ and \hat{W}^S is the potential structural micro-wage settlement forecast using the pre-AIB structural coefficients (presented in Table A.1). Based on the set of wage contracts negotiated in the AIB period but before any rollbacks ordered by the AIB came into force, the estimated effectiveness coefficients are calculated to be 71 per cent using the HW variable and 65 per cent using the alternative VR

21 The precise calculation is based on specific contract data in the two years prior to the establishment of the AIB, comparing the change in the CPI plus 2 per cent per annum to the actual change in wage rates. Owing to the variability in contract lengths and in the third component of the wage guideline formula, the computed wage guideline exhibits some variation at the micro-level.

variable. The two propositions that the AIB was totally effective or totally ineffective in reducing the size of negotiated wage settlements (before it ordered any rollbacks) can be statistically rejected for both labour market variables.²²

BIBLIOGRAPHY

- Addison, J. and J. Burton (1979) 'The identification of market and spillover forces in wage inflation: a cautionary note.' Applied Economics 11, 95-104
- Ashenfelter, O.C. (1971) 'The effect of unionization on wages in the public sector: the case of firefighters.' Industrial and Labour Relations Review 24, 191-202
- Ashenfelter, O.C., G.E. Johnson, and J.H. Pencavel (1972) 'Trade unions and the rate of change of money wages in United States manufacturing industry.' Review of Economic Studies 39, 27-54
- Auld, D.A.L., L.N. Christofides, R. Swidinsky, and D.A. Wilton (1979b) 'The impact of the Anti-Inflation Board on negotiated wage settlements.' Canadian Journal of Economics 12, 195-213
- Auld, D.A.L., L. Christofides, R. Swidinsky, and D.A. Wilton (1979a) The Determinants of Negotiated Wage Settlements in Canada (Ottawa: Anti-Inflation Board)
- Bloom, G.F. and H.R. Northrup (1969) Economics and Labour Relations. 6th ed. (Homewood, Illinois: Richard D. Irwin, Inc.)
- Carlson, J.A. and J.M. Parkin (1975) 'Inflation expectations.' Economica 42, 123-38
- Christofides, L.N. and D.A. Wilton (1979) Wage Controls in Canada: A Study of Their Impact on Negotiated Base Wage Rates. (Ottawa: Anti-Inflation Board)
- Christofides, L., R. Swidinsky, and D.A. Wilton (1980) 'A micro econometric analysis of spillovers within the Canadian wage determination process.' Review of Economics and Statistics 62, 213-21
- Courchene, T.J. (1977) 'Post-controls and the public sector.' Pp. 143-81 in Walker, M., ed., Which Way Ahead? Canada After Wage and Price Controls (Vancouver: Fraser Institute)

22 The standard errors attached to these two estimates are 0.018 and 0.023 respectively.

- Cousineau, J. and R. Lacroix (1978) Wage Determination in Major Collective Agreements in the Public and Private Sector (Ottawa: Economic Council of Canada)
- de Menil, G. and S.S. Bhalla (1975) 'Direct measurement of popular price expectations.' American Economic Review 65, 169-80
- Denton, F.T., C.H. Feaver, and A.L. Robb (1975) 'Patterns of unemployment behaviour in Canada.' Discussion Paper 36 (Ottawa: Economic Council of Canada)
- Dicks-Mireau, L.A. (1961) 'The interrelationship between cost and price changes 1954-1959: a study of inflation in post-war Britain.' Oxford Economic Papers N.S. 13, 267-92
- Dicks-Mireaux, L.A. and J.C.R. Dow (1959) 'The determinants of wage inflation: United Kingdom, 1946-56.' Journal of the Royal Statistical Society A 122, 145-74
- Eckstein, O. and T.A. Wilson (1962) 'The determination of money wages in American industry.' Quarterly Journal of Economics 76, 379-414
- Fogel, W. and D. Lewin (1974) 'Wage determination in the public sector.' Industrial and Labour Relations Review 27, 410-31
- Friedman, M. (1968) 'The role of monetary policy.' American Economic Review 58, 1-17
- Godfrey, L. (1971) The Phillips curve: incomes policy and trade union effects. In Johnson, H.G. and A.R. Nobay, eds, The Current Inflation (London: Macmillan) 99-124
- Gunderson, M. (1977) 'Wage determination in the public sector' (Ottawa: Anti-Inflation Board)
- Hall, R.E. (1975) 'The rigidity of wages and the persistence of unemployment.' Brookings Papers on Economic Activity 2, 301-50
- Johnston, J. and M. Timbrell (1973) 'Empirical tests of a bargaining theory of wage rate determination.' Manchester School of Economics and Social Studies 41, 141-67
- Lipsey, Richard G. (1960) 'The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1862-1957: a further analysis.' Economica 27, 1-31
- (1977) 'Wage-price controls: how to do a lot of harm by trying to do a little good.' Canadian Public Policy 3, 1-13
- Lipsey, R.G. and J.M. Parkin (1970) 'Incomes policy: a re-appraisal.' Economica N.S. 38, 115-37

- Macdonald, D.S. (1975) 'Attack on inflation: a program of national action.' House of Commons Debates 14 Oct. (Press release)
- Marshall F.R., A.M. Cartter, and A.G. King (1976) Labour Economics: Wages, Employment and Trade Unionism. 3rd ed. (Homewood, Illinois: Richard D. Irwin, Inc.)
- McGuire, T.W. (1976) 'On estimating the effects of controls.' In K. Bruner and A.H. Meltzer, eds, The Economics of Price and Wage Controls (North Holland)
- Mills, D.Q. (1971) 'Wage determination in contract construction.' Industrial Relations 10, 72-85
- Ontario Hospital Services Commission (1965-71) Statistical Supplement (Toronto)
- Ontario Ministry of Education (annual) Education Statistics (Toronto)
- Ontario Ministry of Health (1972, 1975) Hospital Statistics (Toronto)
- Parkin, J.M., M.T. Sumner, and R.A. Jones (1972) 'A survey of the econometric evidence on the effects of incomes policy and the rate of inflation.' In J.M. Parkin and M.T. Sumner, eds, Incomes Policy and Inflation (Manchester: Manchester University Press) 1-29
- Perry, G.L. (1966) 'Unemployment, money wage rates and inflation.' Economics Monograph No. 7 (Cambridge, Mass: MIT Press)
- Phelps, Edmund S. (1968) 'Money-wage dynamics and labor-market equilibrium.' Journal of Political Economy 76, 678-711
- (1969) 'The microeconomics in inflation and employment theory.' American Economic Review 59 Papers and Proceedings, 47-60
- Phillips, A.W. (1958) 'The relation between unemployment and the rate of change of money wage rates in the United Kingdom 1861-1957.' Economica 25, 283-99
- Riddell, W.C. (1979) 'The empirical foundations of the Canadian Phillips curve.' Econometrica 47, 1-24
- Sparks, G.R. and D.A. Wilton (1971) 'Determinants of negotiated wage increases: an empirical analysis.' Econometrica 39, 739-50
- Statistics Canada (annual) Provincial Government Employment Statistics (Ottawa)
- Turnovsky, S.J. (1972) 'The expectations hypothesis and the aggregate wage equation: some empirical evidence for Canada.' Economica, N.S. 39, 1-17

- Turnovsky, S.J. and M.L. Wachter (1972) 'A test of the expectations hypothesis using directly observed wage and price expectations.' Review of Economics and Statistics 54, 47-54
- Wilton, D.A. (1977) The Wage Determination Process in Canadian Manufacturing Industries 1962-1975. Discussion paper (Hull, Quebec: Labour Canada)
- Woods, H.D., (1973) Labour Policy in Canada. 2nd ed. (Toronto: Macmillan)

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